EE 368 (Digital Image Processing) Final Project Proposal　　　　　　　　　**Winter 2019**

Project Title: *Computer Vision-Driven Ultimate Frisbee Tracking and Analytics*

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Android Device: Not needed

Project Overview/Goals:

　　　　The goal of this project is to implement a pipeline to process high-definition ultimate frisbee footage in order to track the locations of both the frisbee and players, with the ultimate goal of automatically computing the number of passes which occur. Test footage will include both stationary throwing and throwing which occurs when the intended receiver is in motion. Taking into consideration current advancements and approaches to computer vision-driven sports analytics (see references), we will conduct this analysis in two ways: (1) Using MATLAB image processing methodology which we have learned in class (detailed below) and (2) using the Python-based OpenCV module, which includes various tools for color and motion-based tracking (CSRT Tracker, KCF Tracker, MOSSE Tracker).

Figure 1. Snapshots showing the motion of a typical frisbee pass. In our simulated footage, only one team will be present and players will not be wearing white in order to maintain adequate color contrast with the frisbee.

Proposed Methodology:
  (1) MATLAB Image Processing
- Background subtraction for object tracking, possibly involving adaptive thresholding to correct for shadows, small region removal, etc.
- Template matching, edge detection, and color-based (MAP) recognition to track frisbee and players (try several approaches to see what is most effective)
- Foreground motion deblurring
- Region labeling to determine when passes are completed

  (2) Python OpenCV Analysis
- CRST Tracker testing
- KCF Tracker testing
- MOSSE Tracker testing

Proposed Work Breakdown:
- Caroline: Video capture, recognition and tracking methodology
- Hitha: Deblurring and region labeling/pass counting methodology
- Both: Python OpenCV testing

References:

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